Ali Ladman

**Grade**: 4

**Topic**: Electricity

**Time**: 30 minutes preparation, one class period duration

**Justification**:

As part of the fourth grade curriculum, students will be studying the properties of electricity. They will use what they have learned to apply their knowledge to real world situations including electrical usage in their homes. They will create a timeline to show how long it takes the energy from being manufactured to reaching their homes.

**Standards**:

Students:

P.I. 4.1: Describe a variety of forms of energy (e.g., heat, chemical, light) and the changes that occur in objects when they interact with those forms of energy

* 4.1a Energy exists in various forms: heat, electric, sound, chemical, mechanical, light.
* 4.1b Energy can be transferred from one place to another.
* 4.1c Some materials transfer energy better than others (heat and electricity).
* 4.1d Energy and matter interact: water is evaporated by the Sun’s heat; a bulb is lighted by means of electrical current
* 4.1e Electricity travels in a closed circuit.
* 4.1g Interactions with forms of energy can be either helpful or harmful.

P.I. 4.2: Observe the way one form of energy can be transferred into another form of energy present in common situations (e.g., mechanical to heat energy, mechanical to electrical energy, chemical to heat energy).

* 4.2b Humans utilize interactions between matter and energy.

• chemical to electrical, light, and heat: battery and bulb

• electrical to sound (e.g., doorbell buzzer)

• mechanical to sound (e.g., musical instruments, clapping)

• light to electrical (e.g., solar-powered calculator)

P.I. 7.1: Identify ways in which humans have changed their environment and the effects of those changes.

* 7.1a Humans depend on their natural and constructed environments.
* 7.1b Over time humans have changed their environment by cultivating crops and raising animals, creating shelter, using energy, manufacturing goods, developing means of transportation, changing populations, and carrying out other activities.
* 7.1c Humans, as individuals or communities, change environments in ways that can be either helpful or harmful for themselves and other organisms.

Teacher:

1e: Designing Coherent Instruction

* Lessons that support instructional outcomes and reflect important concepts
* Activities that represent high-level thinking
* The use of varied resources
* Thoughtfully planned learning groups
* Structured lesson plan

3c: Engaging Students in Learning

* Activities aligned with the goals of the lesson
* Student enthusiasm, interest, thinking, problem-solving, etc
* Learning tasks that require high-level student thinking and are aligned with lesson objectives
* Students highly motivated to work on all tasks and are persistent even when the tasks are challenging
* Students actively “working,” rather than watching while their teacher “works.”
* Suitable pacing of the lesson: neither dragging nor rushed, with time for closure and student reflection

**Essential Questions:**

1. How do you know what appliances use less energy?
2. Why is it important to use as little energy in your home as possible?
3. What is the most efficient way to transport energy to your home?

**Objectives:**

1. Students will rank appliances in their home based on their energy usage.
2. Students will identify which energy source currently powers their home, and which source should be used to power their home.
3. Students will create a timeline of how this energy source can be transported to their home.

**Lesson Instructions**

**Opening:**

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| 1. The teacher will hold up a picture of the energy star logo and explain to students that appliances all need different amounts of energy when they are being used. Explain that energy is measured in kWh, kilowatt hours. Explain that some appliances have this energy star logo and it means that they use considerably less energy. 2. Students will be given a copy of OTPCO's energy usage chart..) They will look at each type of appliance and its kWh to determine which appliances use the most energy. Students will turn and talk about why some appliances use more energy than other appliances   . |

**Core Activities:**

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| 1. Allow students time to share what energy source their parents use to power their home. 2. Pass out cards with one part of the fossil fuels power plant timeline. Each part of the timeline would say one way that fossil fuels travel from the plant to a home. The timeline would include intermediate steps like power plant, transformer, and power lines. 3. Have students work in groups based on how many intermediate steps the teacher includes in the timeline. The more intermediate steps and details that are included, the more difficult the timeline will be. 4. Each group will talk together and figure out the order of the timeline for fossil fuels transporting to a home. 5. Answers should be given to the whole class to correct any errors. 6. Students will make a timeline of how the energy source they chose in week three as being the most sustainable begins and ends at their home. They will use information learned to make their timeline. Their timeline of images should mimic the one the teacher made. |

**Assessment**

Students will be assessed on their timeline of their energy source transportation. Students will also be assessed on their response to the essential questions.

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| Student Understanding | • There is evidence that the student has a **full and complete** understanding of the question or problem.  • The supporting scientific evidence is complete and demonstrates a full integration of scientific concepts, principles, and/or skills. | • There is evidence that the student has a **general** understanding of the question or problem.  • The supporting scientific evidence is generally complete with some integration of scientific concepts, principles, and/or skills. | • There is evidence that the student has **minimal** understanding of the question or problem.  • The supporting scientific evidence is minimal. | • There is evidence that the student has **no** understanding of the question or problem. |
| Student Response | The response reflects a complete synthesis of information, such as data, cause-effect relationships, or other collected evidence. | The response reflects some synthesis of information, such as data, cause-effect relationships, or other collected evidence. | The response provides little or no synthesis of information, such as data, cause-effect relationships, or other collected evidence. | The response is completely incorrect or irrelevant or there is no response. |
| Terminology | The accurate use of scientific terminology strengthens the response. | The accurate use of scientific terminology is present in the response. | The accurate use of scientific terminology may not be present in the response. | The accurate use of scientific terminology may not be present in the response. |
| Application of Knowledge | An effective application of the concept to a practical problem or real-world situation reveals a complete understanding of the scientific principles. | An application of the concept to a practical problem or real-world situation reveals a general understanding of the scientific principles. | An application, if attempted, is minimal. | An application, if attempted, is minimal. |